

IN THE CLAIMS

Please amend the claims as follows:

Claim 1 (Currently Amended): A measuring apparatus used for a grinding tool using a grinding surface comprising a surface of a tool base on which a large number of abrasive grains are discretely formed, to measure the amount of projection of each of the abrasive grains, the apparatus comprising:

a camera unit provided opposite the grinding surface to pick up an image of the grinding surface; and

a control unit connected to the camera unit,

the control unit comprising:

means for moving a focal position of the camera unit in a direction perpendicular to the grinding surface;

means for causing the camera unit to pick up the image of the grinding surface synchronized with movement of the focal position;

means for storing a first basic image pattern corresponding to an image obtained when the focal position is set at the tip of the abrasive grain, a second basic pattern corresponding to an image obtained when the focal position is set at the bottom of the abrasive grain, and a third basic image pattern obtained when the focal position is set at the tip and bottom of the abrasive grain;

means for comparing the image data, every time the data is obtained, with the first, second and third basic image patterns

means for detecting image data approximate to the first, second, and third image patterns on the basis of a result of the comparison; and

~~detection means for comparing a predetermined basic image pattern with a plurality of image data obtained by the camera unit, to detect image data approximate to the basic image pattern; and~~

means for calculating the amount of projection of the abrasive grains on the basis of the focal position at which the detected image data was obtained by the camera unit.

Claim 2 (Original): The measuring apparatus according to claim 1, wherein the means for moving the focal position moves the focal position step by step in increments preset on the basis of a focal depth of the camera unit, and

the means for causing the camera unit to pick up an image of the grinding surface causes the camera unit to pick up the image of the grinding surface every time the focal position is moved.

Claim 3 (Canceled).

Claim 4 (Original): The measuring apparatus according to claim 1, wherein the means for causing the camera unit to pick up an image of the grinding surface stores, in an image memory, a plurality of image data obtained by the camera unit while the focal position is being moved within a preset movement range, and

after the plurality of image data has been stored, the detection means sequentially reads the plurality of stored image data from the image memory to compare each image data with the basic image patterns.

Claim 5 (Original): The measuring apparatus according to claim 1, wherein every time the focal position is moved a specified distance, the means for causing the camera unit

to pick up the image of the grinding surface loads one frame of the image data obtained at the focal position by the camera unit, and

every time the one frame of the image data is loaded, the detection means compares the loaded one frame of the image data with the basic image pattern.

Claim 6 (Original): The measuring apparatus according to claim 1, wherein the control unit further comprises:

means for moving the grinding tool and the camera unit in a horizontal direction relative to the grinding surface; and

means for utilizing the horizontal movement to place the camera unit opposite each of a plurality of positions on the grinding surface to be measured.

Claim 7 (Currently Amended): A measuring method used for a grinding tool using a grinding surface comprising a surface of a tool base on which a plurality of abrasive grains are discretely formed, to measure an amount of projection of the abrasive grains, the method comprising:

a step of picking up an image of the grinding surface while moving a focal position of a camera in a direction perpendicular to the grinding surface;

a step of comparing the image data, every time the data is obtained, with a first basic image pattern corresponding to an image obtained when the focal position is set at the tip of the abrasive grain, a second basic pattern corresponding to an image obtained when the focal position is set at the bottom of the abrasive grain, and a third basic image pattern obtained when the focal position is set at the tip and bottom of the abrasive grain;

a step of detecting image data approximate to the first, second, and third image pattern on the basis of a result of the comparison; and

~~a step of comparing a predetermined basic image pattern with a plurality of image data obtained by the camera, to detect image data approximate to the basic image pattern; and~~
a step of calculating the amount of projection of the abrasive grains on the basis of the focal position at which the detected image data was obtained by the camera.

Claim 8 (Original): The measuring method according to claim 7, wherein the step of picking up the image of the grinding surface comprises moving the focal position step by step in increments preset on the basis of a focal depth of the camera and picking up the image of the grinding surface every time the focal position is moved.

Claim 9 (Canceled).

Claim 10 (Original): The measuring method according to claim 7, wherein the step of picking up an image of the grinding surface stores the plurality of image data obtained by the camera while the focal position is being moved within a preset movement range, and
the step of detecting image data comprises, after the plurality of image data have been obtained by the camera and stored, sequentially reads the plurality of stored image data to compare each image data with the basic image patterns.

Claim 11 (Original): The measuring method according to claim 7, wherein the step of picking up an image of the grinding surface comprises loading one frame of the image data obtained at the focal position by the camera every time the focal position is moved a specified distance, and

the step of detecting image data comprises, every time the one frame of the image data is loaded, comparing the loaded one frame of the image data with the basic image pattern.

Claim 12 (Original): The measuring method according to claim 7, further comprising:

a step of moving, before picking up the image of the grinding surface, the grinding tool and the camera in a horizontal direction relative to the grinding surface and aligning an image pickup surface of the camera with a position on the grinding surface to be measured.